Environment Northeast

6 Beacon Street, Suite 415
Boston, MA 02108
www.env-ne.org

Rockport, ME
Portland, ME
Providence, RI
Hartford, CT
Charlottetown, PE, Canada

Via Electronic Mail

October 15, 2008

Philip Giudice, Commissioner
Massachusetts Department of Energy Resources
100 Cambridge Street, Suite 1020
Boston, MA 02114

Re: Massachusetts Department of Energy Resources' Inquiry into the Alternative Energy Portfolio Standard, G.L. Chapter 25A, Section 11F½.

Dear Commissioner Giudice:

Environment Northeast ("ENE") appreciates the opportunity to submit these comments in response to the Department of Energy Resources' inquiry regarding the Alternative Energy Portfolio Standard ("APS") contained in the Green Communities Act ("GCA" or "the Act"). ENE is a regional non-profit organization that researches and advocates innovative environmental policies for New England and eastern Canada. ENE is at the forefront of state, provincial, and regional efforts to combat global warming with solutions that promote clean energy, clean air, healthy forests, and a sustainable economy.

ENE spent considerable time working with a wide variety of policymakers and stakeholders during the legislative process in helping to develop the APS language and believes that it can be, if properly implemented, a useful policy tool in developing low-carbon, efficient energy resources.

Overview

ENE applauds Massachusetts' leadership in enacting *An Act Relative to Green Communities*. The Patrick Administration has been a profound leader on clean energy and global warming policy and is to be commended for swift implementation of the APS and other portions of the Act.

At the outset, ENE believes the Department can best serve the goals of the Green Communities Act and the Alternative Energy Portfolio Standard by treating the APS as a market based incentive where all the technologies in the APS compete based on environmental performance. Thus, there should not be carve outs for specific technologies – special deals for specific technologies are not appropriate. All qualifying technologies should compete within one "bin" of resources to achieve the percentage requirement set by the Department. Nevertheless, in accordance with the Act, there should be additional environmental performance requirements for individual technologies to reflect their unique attributes.

The APS should be designed to drive innovation and commercialization of technologies with superior climate and environmental performance, and should not be used to subsidize technologies with average performance which are commercially and widely available today. To achieve these goals, ENE urges the Department to set an aggressive emissions limit for CO_2 and other pollutants that will ensure ratepayers

only subsidize technologies with superior environmental performance. In addition to meeting the goals of the Green Communities Act, aggressive limits will also help the Commonwealth achieve the economy-wide emissions targets of the Global Warming Solutions Act. Several design elements are essential. First, the Department should require continuous improvement for all technologies and emission performance standards. Second, there should be a time cut-off for how long technologies qualify, *e.g.,* no longer than 10 years of eligibility for a project. Third, only new resources should qualify to avoid having ratepayers pay a subsidy for no incremental environmental benefit.

Responses to Specific Questions

A. How should the Annual APS percentage rate be determined, and what should that rate be?

The Department should develop a single, annual APS percentage rate that applies to all APS-qualified technologies. ENE recommends that the Department build an estimate of the supply curve by technology from the bottom up in order to determine the annual APS percentage rate. This would entail developing an estimate of technical and achievable potential by technology and year.

1. Combined Heat & Power (CHP)

To assist in the assessment of CHP resources, the Department should make use of the recent potential analysis performed by UMass and NESCAUM.[1] ENE estimates that achieving 25% of the technical potential in MA by 2015 would require APS percentages increasing by about 1% of total load per year (see table below). This estimate was generated in 2007 in the context of a legislative proposal for a stand alone CHP portfolio standard and is directly applicable to the APS.[2]

To qualify for the APS, CHP projects must demonstrate a high efficiency level to ensure energy efficiency benefits. This is likely to force projects to follow thermal, not electric, load (*i.e.*, projects will need to be sized based on thermal load). The APS should reward efficient CHP projects that serve both thermal and electric loads, but should not favor CHP in those instances when the grid and a high efficiency furnace/chiller are a more suitable option. While ENE needs to conduct further research, our initial projections suggest that a threshold efficiency level for CHP should be set at least 70% efficiency, and perhaps higher (75%, 80%).

In addition, the Department should examine the costs and benefits of CHP. Appropriate CHP projects can move demand off the system, thus benefitting all ratepayers by reducing the clearing price for wholesale electricity. These system benefits (*e.g.*, DRIPE) as well as potential costs should be examined and accounted for when gauging the benefits of CHP projects.

[1] *See* Lauren R. Mattison, *Technical Analysis of the Potential for Combined Heat and Power in Massachusetts*, May 2006. ENE notes that the Massachusetts Technology Collaborative has also commissioned a potential study for CHP in Massachusetts. *See* http://www.masstech.org/dg/2008-03-MA-CHP-Market-KEMA.pdf ENE believes that this will also be a helpful tool in assessing CHP resources and potential for the Commonwealth.

[2] *See* Environment Northeast, "Estimates of the Benefits of Expanded CHP and Solar Capacity in MA," May 24, 2007, attached hereto as Exhibit A.

The table below is a "ball-park" estimate of the CHP potential in MA. ENE developed this table in the context of a stand alone CHP portfolio standard in 2007, but the data nevertheless can apply to the APS.[3]

MA CHP Portfolio Standard

Environment Northeast

Assumptions

Technical Potential	4,700	MW (Mattison, 2006)
Achievable	25%	(ENE Number)
Target	1,175	MW
Capacity Factor	50%	(ENE Number)

Portfolio Standard Projection

	ISO-NE State Energy Forecast	***CHP PS Targets***			
	Net Energy for Load (GWH)	Target % of	Energy from CHP	CHP %	CHP PS
MA	Base	Achievable	MWh	of Load	%
2005	60,850				
2006	61,500				
2007	59,980				
2008	60,720				
2009	61,660				
2010	62,630	17%	857,750	1.4%	1%
2011	63,690	33%	1,715,500	2.7%	2%
2012	64,640	50%	2,573,250	4.0%	3%
2013	65,490	67%	3,431,000	5.2%	4%
2014	66,300	83%	4,288,750	6.5%	5%
2015	67,095	100%	5,146,500	7.7%	6%

2. Gasification with carbon capture and permanent storage (Gasification w/CCPS)

Gasification with carbon capture and permanent storage is a potentially promising technology; however, the Department should acknowledge that it is, at present, limited in two fundamental ways. First, there is a practical constraint on the rate at which gasification facilities can be designed, permitted, and built. Secondly, there is a similar constraint on the rate at which carbon capture and storage can be permitted and built.

For both limitations, one critical barrier appears to be the absence of regulations for carbon capture and storage in the state where CCPS is occurring (see discussion below at B(3)). The Department should consult with other states and the EPA on the timeline for the development of regulations in various states and should limit the supply curve based on this information. The supply curve should also be limited based on estimates from industry and other experts on the rate and quantity at which this technology can move from research and demonstration to commercialization.

[3] In addition to ENE's analysis, the Department should also analyze more recent CHP potential analyses by NESCAUM/UMass and by KEMA (for the Massachusetts Technology Collaborative).

3. Flywheel energy storage

ENE believes that developers and utilities seeking APS qualification for flywheel energy storage should be asked to provide information on the potential for this technology and its characteristics. We note also that this technology does not produce any energy as it is an energy storage device. As a result, its eligibility and treatment within the APS requires more discussion and an examination of benefits, including avoided peaking capacity and emissions.

4. Paper-derived fuels

ENE believes that potential developers and utilities seeking APS qualification for paper-derived fuel should be asked to provide information on the potential for this technology and its characteristics.

5. Energy efficient steam technology

From the language of the GCA, it is not clear which types of "energy efficient steam technologies" may qualify for APS consideration. In setting the steam technology portion of the APS supply curve, the Department should clearly identify specific technological applications and should ensure that qualifying technologies meet stringent CO_2 requirements, are subject to periodic improvements to the emission requirements, and are limited to new technologies. ENE believes that technologies that qualify under this sector should be those that harvest waste steam. The APS should not provide support for steam boilers that run turbines, unless they are CHP units, in which case they should qualify under the CHP section. Despite this lack of detail, ENE expects that the capacity for energy efficient steam technology in the APS will be relatively low when compared to CHP.

B. <u>What criteria should be required for any of the specified eligible technologies or fuels?</u>

The Department must ensure that the APS promotes only those technologies that carry positive and substantial environmental attributes. Providing a public incentive for certain energy technologies requires that those qualifying technologies advance the public goals articulated in the GCA and the GWSA. There should be a continuous improvement requirement for all technologies to ensure that this public money being used to commercialize new and improved technologies with superior climate and environmental performance.

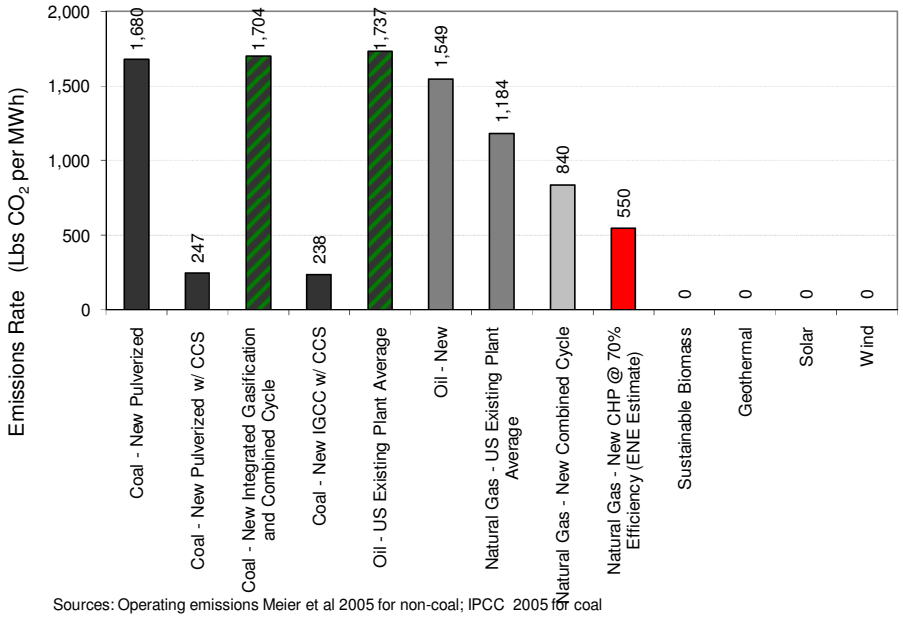
1. The Department Should Set Stringent Emissions Standards for <u>All</u> APS Technologies.

The language of the Act requires the Department, in consultation with DEP, to set "a net carbon dioxide emissions rate not to exceed the average emissions rate of existing natural gas plants in the commonwealth."[4] Because the rate is "not to exceed" the existing gas plant rate, the Department would be well within its statutory duties if it set a CO_2 limit as low as 0 lbs per MWh. Because that the goal of this public subsidy should be for the APS to encourage superior climate performance such as that available by highly efficient CHP, ENE believes that setting the rate at zero would be impractical. Our initial estimate is that the right limit is no more than 550 lbs per MWh, including useful thermal output. This would ensure that the Commonwealth is promoting technologies with immediate and proven climate benefits at a level at which one of the technologies named in the APS statute (*i.e.*, efficient CHP) can achieve today.

[4] G.L. c.25A § 11F ½ (b)(2).

The Act places an affirmative requirement that emissions performance standards be "consistent with the commonwealth's environmental goals, including, but not limited to, the reduction of greenhouse gas emissions."[5] The GCA establishes "renewable and alternative energy and energy efficiency goals" including 80% efficiency for CHP systems by 2020.[6] Moreover, the GWSA establishes economy-wide limits to greenhouse gas emissions including 10-25% below 1990 levels by 2020 and 80% below 1990 levels by 2050.[7] Thus, the Department should set an APS CO_2 emissions limit of no more than 550 lbs/MWh for all APS technologies, which is consistent with Commonwealth's environmental and GHG reduction goals and can be met by existing APS technologies such as highly efficient CHP.

The following chart depicts CO2 emissions rates from different fuels and generating plants.



In addition to CO_2 limits, the statute requires the Department, in consultation with DEP, to set other emissions standards "for all technologies included" in the APS.[8] We believe that the Department should set maximum emissions rates for all criteria air pollutants in order to drive APS incentive dollars towards innovation in clean technologies.

2. To Qualify for APS, Combined Heat and Power Technologies Must Meet Minimum Efficiency Requirements.

In addition to the emissions requirements that apply to all APS technologies, the Department must craft requirements that are specific to particular technologies. This will insure that the APS incentive will stimulate economically and environmentally beneficial installations. For CHP, the Department must set minimum annual average efficiency level both in terms of installation design and, once installed, actual operation. ENE believes that the initial efficiency threshold for CHP projects to qualify for APS

[5] G.L. c. 25A §11F ½ (b)(1).
[6] *See* c. 169 of the Act of 2008 § 116(a).
[7] G.L. c. 21N § 3(b); § 4(a).
[8] G.L. c.25A § 11F ½ (b)(1).

certificates should be at least 70%, and perhaps even higher. In addition to setting this minimum efficiency requirement, the Department should systematically and periodically revisit and, when appropriate and achievable, increase the minimum efficiency threshold.[9] A high efficiency level ensures energy efficiency benefits, and reduces the chance that projects that waste thermal energy receive APS subsidies.

To capture the full benefits of CHP projects, the Department should encourage the use of energy on-site. This can be achieved by giving CHP system owners credit for output using the behind the meter standards through the NEPOOL GIS.[10]

As a final consideration, like all eligible technologies, APS must be limited to new CHP resources in order to ensure public subsidy delivers incremental environmental and economic benefits.

3. Gasification with Carbon Capture and Permanent Sequestration Presents Significant Challenges.

Gasification with carbon capture and permanent sequestration ("w/CCPS") presents perhaps the greatest challenge to the design and implementation of a successful APS. In addition to setting strict and workable regulations in Massachusetts, gasification w/CCPS requires working with upstream states (and perhaps countries) to ensure that sequestration is actual, permanent and verifiable. As indicated in the Act, the emissions from gasification w/CCPS projects must "include all emissions related to combustion, gasification, fuel processing and sequestration, whether or not such activities occur at the alternative generating source or at another location."[11] Ensuring statutory compliance will require a protocol to measure emissions in every step of the process. Moreover, given the fact that much of this activity may take place outside Massachusetts, all measurement and verification should be reviewed and certified by an independent third-party verifier who has been qualified and approved by the Department.

The Act is very clear that carbon must be permanently stored: "gasification with capture and permanent sequestration of carbon dioxide" (emphasis supplied).[12] Ensuring permanent storage is a significant hurdle and much work is being done in this area that should be examined in the rulemaking.[13] In particular, there should be a long-term monitoring plan and an insurance mechanism to pay for any damages associated with releases and to offset any CO_2 emissions in the future.

The injection of carbon dioxide into geologic formations requires a state or federal permit under the Safe Drinking Water Act and potentially other state or federal permits. EPA has issued draft rules related to this issue;[14] however, in order for a facility to qualify, it must be located in a state where regulations have been completed.[15] Because of the challenges associated with permanent CO_2 storage, ENE believes that the Department should consider requiring the host state (*i.e.*, the state where the CO_2

[9] ENE notes that the Green Communities Act articulates a goal of 80% annual efficiency for CHP systems by 2020. *See* c. 169 of the Acts of 2008 § 116(a)(1).
[10] *See* Exhibit A.
[11] G.L. c.25A § 11F ½ (b)(2).
[12] G.L. c.25A § 11F ½ (a).
[13] During the September 29, 2008 stakeholder forum, the Department raised the idea of delaying the APS-eligibility for gasification w/CCPS to allow permanent CO_2 storage to become proven as a commercially and technically feasible endeavor with proven monitoring and verification regulations in place to ensure permanent sequestration. ENE believes that this is a reasonable approach and urges the Department to consider a one-year APS delay for gasification technologies.
[14] http://www.epa.gov/safewater/uic/wells_sequestration.html
[15] ENE understands that only the state of Washington has completed such a rulemaking, and Wyoming is the only state actively developing rules. In light of EPA's final rule, the Washington and Wyoming rules may need to be updated.

will be stored) to sign a memorandum of understanding with the Commonwealth. At a minimum, any such MOU must (1) ensure full sharing of data on the facility where the CO_2 will be stored, and (2) certify that any permit violations can lead to immediate disqualification from the Massachusetts APS. Cooperation with host-state regulators will be essential to ensure that CO_2 sequestration is permanent and complies with the GCA.

MA policy makers and citizens should not be spending money incenting a technology that negatively impacts the environment of other states. To that end, there should be a review of each proposed project using environmental impact information that ensures that the project protects human health and safety, protects ecosystems, and protects underground sources of drinking water, and other natural resources. Massachusetts should also solicit feedback on the project from stakeholders in the host state by requiring that the project developer run notices in local papers describing the project and inviting comments to be sent to DOER prior to project approval.

The Department should not lose sight of the fact that Massachusetts ratepayers will be funding activities. As a result, eligible projects should forfeit any potential offsets or other voluntary GHG market incentives to the Commonwealth. While the state should not exercise these offset/voluntary incentives in any financial way, it should be free to acknowledge the associated benefits in climate plans.

As other jurisdictions begin to tackle CCPS, the Department should examine regulations and information from other states during the rulemaking process. A list of some resources that should be examined is below:

- EPA Draft Rule: Proposed rule for Federal Requirements Under the Underground Injection Control (UIC) Program for Carbon Dioxide (CO_2) Geologic Sequestration (GS) Wells, http://www.epa.gov/safewater/uic/wells_sequestration.html
- Regulations from the State of Washington:
  Chapter 173-407 WAC, Carbon Dioxide Mitigation Program for Fossil-Fueled Thermal Electric Generating Facilities http://www.ecy.wa.gov/biblio/wac173407.html and
  Chapter 173-218 WAC, Underground Injection Control Program
  http://www.ecy.wa.gov/biblio/wac173218.html
- World Resources Institute CCS Guidelines (to be released in October of this year):
  http://www.wri.org/project/carbon-capture-sequestration

4. *APS Eligibility for Flywheel Energy Storage Should be Limited to Applications with Demonstrable Environmental Benefits.*

Because its economic and environmental benefits are likely to be limited, flywheel energy storage eligibility for the APS should be limited as well. At the outset, ENE notes that strict reading of the Act suggests that flywheel energy storage may not even qualify for the APS. Section 11F ½ requires retail supplies to provide a minimum percentage of sales "from alternative energy generating sources." Flywheel energy storage systems, as its names suggests, act as a battery, storing energy that has been generated elsewhere and is thus, arguably, not an "energy generating source."[16]

Nevertheless, flywheel systems can carry environmental and economic benefits. Storing energy during off-peak periods for use during peak times can reduce strain on the grid and lower wholesale electricity prices. Environmental benefits will vary depending on the source of energy they use for charging and

[16] According to one flywheel producer, "A flywheel energy storage system draws electrical energy from a primary source, such as the utility grid, and stores it in a high-density rotating flywheel. The flywheel system is actually a kinetic, or mechanical battery, spinning at very high speeds (>20,000 rpm) to store energy that is instantly available when needed." http://beaconpower.com/products/EnergyStorageSystems/flywheels.htm#

the plants they offset when supplying energy. To the extent flywheels can store power generated from low-emissions sources (*e.g.,* renewables, efficient CHP), there may be climate and other environmental benefits. As a result, the Department should recognize the limitations of flywheels as an alternative energy resource and should limit flywheel energy storage in the APS to only those applications that (a) produce energy only during peak periods and consume it only during off-peak and/or (b) store and produce energy originally generated from low or zero emission sources (*e.g.*, RPS eligible resources). In any event, to be eligible for the APS, a flywheel developer must demonstrate that the proposed project meets the overall APS emissions standards, inclusive of the emissions of the original generation source.

5. To Ensure Environmental Benefits, the Department Should Limit the Use of Paper-derived Fuels in the APS.

As for all APS technologies, the Department should structure its regulations concerning paper-derived fuels in a way that ensures environmental benefits. To achieve this goal, ENE recommends limiting the qualification of paper-derived fuel technologies in a number of ways. First, APS credit should be assigned only to the electric output that comes from the paper portion of the fuel input. Thus, APS credits should be discounted by the extent to which non-paper materials (*e.g.*, plastics or fossil fuels) are used to generate electricity. As a corollary to this principle, easily recycled plastics should not be eligible for APS. Second, virgin paper or easily recycled paper should not be eligible because of the lower energy inputs associated with recycling and the need to encourage the displacement of virgin paper use. Third, energy generated from paper-derived fuels must meet the overall emissions limits common to all technologies, including CO_2. CO_2 emissions should be considered neutral only if the source of the paper can be shown to come from sustainably managed forests. Under these circumstances, ENE believes that only a limited portion of the APS could be met through energy generated from paper-derived fuels.

6. "Energy Efficient Steam Technology" Must be More Fully Defined.

The Act also lists "energy efficient steam technology" as a qualifying resource for the APS. However, the statutory language does not explain what types of technology the legislature contemplated. The statute does appear to limit the number of eligible technologies, including energy efficient steam technology, by excluding several broad technology categories including "coal, except when used in gasification; petroleum coke, except when used in gasification; oil; natural gas, except when used in gasification or combined heat and power; and nuclear power."[17] Considering the statutory language and the potential for a wide variety of technologies to fit into this category, the Department should explore and explain what specific applications may qualify. One technology application that should be considered is the generation of electricity from waste steam recovery, provided that climate benefits can be demonstrated. In any regard, any eligible efficient steam technology, must meet the same efficiency standards as CHP (*i.e.*, at least 70%) and the same emissions standards (CO_2, criteria pollutants, and others) that apply to all APS technologies.

C. <u>What should the Alternative Compliance Payment (ACP) amount be for APS, and how should it be calculated?</u>

In setting the alternative compliance payment for ACP, the Department must strive to balance the climate and environmental benefits of these technologies with the costs of implementing them. There is a need to support nascent industries, but is clear that most APS technologies will not carry the same climate and environmental benefits that RPS-eligible renewables bring. As a result, the Department should set the APS ACP significantly lower than current RPS ACPs. With the caveat that ENE needs to conduct further analysis on this issue, our initial thinking is that an appropriate ACP will be in the neighborhood of $5 to $15 per MWh.

[17] *See* G.L. c. 25A § 11F ½ (a).

D. What criteria should be applied to emission performance standards and permanent CO_2 sequestration standards as referenced in the Act?

Our recommendations concerning emissions performance standards and permanent carbon dioxide sequestration standards are set forth in section B(3) above.

E. What specific means of monitoring and verification will be necessary for compliance with the APS regulation?

The Department will need to establish a set of reporting, monitoring and verification protocols and regulations to ensure that the APS promotes the development of clean alternative energy. Those protocols must also minimize the transaction costs of qualification and compliance. To that end, the Department should build upon its experience with the RPS, while tailoring specific requirements to meet the unique needs of APS technologies. The Department must require and verify the emissions rates of CO2 and other pollutants for all APS technologies. In addition, as described above, the Department must set standards that ensure each technology meets specific benchmarks unique to its circumstances. This means that the efficiency of CHP systems must be tracked; actual, verifiable and permanent storage of CO2 from gasification projects must be assured; the content of paper-derived fuels must be monitored and verified; etc. For those projects and applications that fail to meet reporting or performance requirements, there should be appropriate consequences, including disqualification of a project from the APS.

Conclusion

The Department has a unique opportunity to shape the Alternative Energy Portfolio Standard in a way that benefits Massachusetts rate payers, protects our environment and climate, achieves superior environmental performance, and helps stimulate technological innovation of low-carbon energy sources. As set out above, we believe that these goals are achievable through thoughtful regulation and oversight.

Again, ENE commends Governor Patrick, the Department, and the Executive Office of Energy and Environmental Affairs for its extraordinary leadership on clean energy and climate issues. We appreciate the opportunity to offer these comments and look forward to continued participation as the Department moves forward with the regulatory process.

Sincerely,

/s/ Samuel Krasnow

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Samuel Krasnow
Policy Advocate and Attorney

/s/ Jeremy McDiarmid

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Jeremy McDiarmid
Staff Attorney